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Is Upper Extremity Pain An Important Cause Of Sleep Problems In Patients With Multiple Sclerosis?

Upper extremity pain and sleep in multiple sclerosis

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Abstract
Aim: In this study, we aimed to examine the localization of pain in multiple sclerosis (MS) patients and to determine the relationship of pain localization with quality of life, sleep and depression level.
Material and Methods: Eighty-six MS patients (19 males, 67 females, age: 18-65 years, Expanded Disability Status Scale (EDSS) Level 1-8) were included in the study. The pain was evaluated with the Short Form Mc-Gill Pain Questionnaire (SF-MPQ), quality of life (QoL) with the Nottingham Health Profile (NHP), sleep quality with the Pittsburg Sleep Quality Index (PSQI) and mood of depression with the Beck Depression Inventory (BDI).
Results: The percentage of patients with pain was 55.8. Patients complained of the neck (4.2%), upper extremity (25%), headache (14.5%), low back pain (47.9%), upper back pain (5%) and lower extremity pain (58.3%). NHP scores (total: p=0.033, pain: p=0.001, sleep: p=0.0033) and sleep quality (p=0.014) were better in patients without pain. In addition, there was a weak to moderate correlation between several PSQI scores (sleep quality: rho=0.498, p=0.001, sleep latency: rho=0.440, p=0.002, sleep efficiency: rho=0.343, p=0.017 and total: rho=0.379, p=0.008) and upper extremity pain.
Discussion: Upper extremity pain affects sleep quality and therefore QoL in patients with MS. For this reason, when examining the pain of MS patients with sleep problems, especially questioning this region and adding modalities to the program to relieve upper extremity pain may contribute to the sleep quality that it affects. Thus, the quality of life can be positively affected in many ways. Further studies are required to obtain exact conclusions.

Keywords
Multiple Sclerosis, Pain, Localization Sleep.

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Introduction

Pain is a common problem in multiple sclerosis (MS) patients and ranging from 29% to 86% [1]. Pain in MS has been classified in different ways according to its etiology, type and localization in pain studies. It is seen that the etiology of pain is attributed to spinal injuries [2] lesions in the central motor pathways and sensorial pathways, nociceptive stimuli due to motor disorders, drugs, etc. [3]. Pain in MS is categorized in different ways such as nociceptive, central, peripheral neuropathic, spasticity-related pain, psychogenic, idiopathic, and mixed pain [3, 4]. Pains such as migraine, trigeminal neuralgia, L'hermitte sign, dysesthetic pain, back pain, visceral pain, and extremity pain are considered in different categories in some studies [3, 5] and are sometimes excluded from studies [4, 6]. When pain complaints of MS patients are examined, it has been reported that pain is felt in forms such as stinging, numbness, electrical currents, tightness, burning, squeezing, pressing, painful dysesthesias, aching, pinching, tingling, cramping, throbbing, stabbing, smarting, cutting [2, 4, 6]. Patients have reported pain in many localizations from head to feet, including the face and around the eyes [3, 4].

Pain has been associated with high EDSS scores, age, education level, gender, disease duration, spinal lesions, progressive MS, and multiple attacks [2, 5]. Pain in MS occurs in many different parts of the body depending on different mechanisms and etiology and has a multidimensional negative effect on the lives of patients. Previously, the negative impact of pain on the activity of daily living, social performance, mental health, mood, and quality of life has been reported in many studies [7, 8]. Many of these studies provided information on the type and duration of pain in MS. However, although it has been shown in the literature that pain localization is associated with sleep, general activity level, enjoying life, mood, and walking ability [9], no study has been conducted on the effect of pain localization in MS. Our study aims to examine the localization of pain in MS patients and to determine the relationship of pain localization with quality of life, sleep and depression level.

Material and Methods

This cross-sectional study was conducted at Hacettepe University, Ankara, Turkey. Hacettepe University Non-Interventional Ethical Committee approved the study (GO16/462-44). Eighty-six MS patients (EDSS 1 – 8) who were administered Neurology department were recruited. The inclusion criteria were as follows: age between 18- 65 years, diagnosed with definite MS by neurologists, Standardized Mini-Mental Status Examination score above 24, no relapse within 1 month, having any other chronic disease. Patients with hearing or visual impairments and cooperation problems were excluded from the study.

Assessments

All patients signed a written informed consent form, and then the following assessments were applied to the patients who accepted to participate in the study. Patients' demographic data and information about the course of the disease were recorded before performing clinical assessments.

Disability level: The patient's disability level was determined by Expanded Disability Status Scale (EDSS). The EDSS is between 0 to 10. Lower scores indicate a minimal disability level [10].

Pain

Patients who have pain were given detailed information about how they fulfill The Turkish version of the Short Form Mc-Gill Pain Questionnaire (SF-MPQ). The SF-major MPQ's component comprises 15 descriptive words for the pain experience (11 sensorial and 4 emotional), which the patient rates on a point scale based on their intensity (0 = none, 1 = mild, 2 = moderate, and 3 = severe). The intensity rank values of the words selected for the sensory, affective, and overall descriptors are added to provide three pain scores. Sensory and emotional intensity values are added to determine the sensory and affective scores. The intensity levels add up to the final score. The visual analogue scale and the evaluative total pain intensity index are two additional ways that the SF-MPQ measures pain intensity [11]. Physical therapists interviewed the patients face- to- face and in a silent room for making an accurate pain assessment.

Quality of life

The Turkish version of the Nottingham Health Profile (NHP) was used for the assessment of QoL. The Turkish version of the Nottingham Health Profile (NSP) is a self-reported general health questionnaire. It includes 38 items and 6 sub-parameters such as energy level (EL), emotional reactions (ER), physical activity (PA), pain (P), sleep (S) and social isolation (SI). The answers to the questions are given as "yes" and "no" according to the current situation perception. The total score is between 0 and 600, and the perception of high quality of life related to health is inversely proportional to the score obtained [12].

Sleep Quality

The seven-component Pittsburg Sleep Quality Index (PSQI) was used to assess the quality of sleep. The Turkish validity and reliability study of the scale was performed by Hisli et al. Each component assesses various elements of sleep (sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction). The overall score ranges from 0 to 21, with the highest values indicating poor sleep [13].

Mood of depression

Beck Depression Inventory (BDI), the Turkish version of which was developed by Hisli et al. [14], measures the physical, emotional, motivational, and cognitive symptoms of depression. The BDI consists of 21 items and each item is scored between 0-3 points. The total score ranges from 0 to 63. High scores indicate increased severity of depression. The BDI was administered in a silent room and gave patients adequate time.

Statistical Analyses

Data analysis was performed with SPSS 20.0 (SPSS Inc., Chicago, Illinois, USA). The normality was checked by the Kolmogorov-Smirnov test. The homogeneity of group variances was checked by the Levene test. To determine the direction and strength of the relationship between the two variables, Pearson's correlation analyses were used in a normal distribution, and Spearman's correlation analyses were used in non-normal distribution. Point biserial correlation was used for analyzing the correlation between categorical variables and dichotomous variables. Correlation values were considered weak correlation for r values up to 0.39, moderate for values between 0.40 and 0.69, and strong for values equal to or greater than 0.70 [15].

Student t-test was used to compare two independent variables with normal distribution and the Mann Whitney-U Test with non-normal distribution. P <0.05 was considered statistically significant.

Results

77.9% of the 86 patients included in our study were female, 22.1% were male, and the mean age was 34.97 ± 5.16 years. 55.8% of patients complained of pain, while 44.2% of the patients had no pain complaints. When the painful areas of the patients with pain were questioned, it was seen that 4.2% complained of neck pain, 25% of upper extremity pain, 14.5% of headache, 47.9% of low back pain, 5% of upper back pain and 58.3% of lower extremity pain. The socio-demographic characteristics and clinical course of the disease are shown in Table 1.

Table 1. The sociodemographic characteristics and clinical course of the disease

	Values
Age (year) (X±SD)	34.97±9.16
Gender F/M (%)	77.9/22.1
BMI (kg/m2)	24.02±4.27
MS duration (year)	6.38±5.61
EDSS (median (25%-75%))	4 (3-6)
MS Type PP/SP/RR (%)	24.4/10.5/65.1
Relationship Yes/No	36/50
Education P/H/G	33/25/29
Localization of pain n (%)	
Headache	7 (14.5)
Neck	2 (4.2)
Upper extremity	12 (25)
Upper back pain	5 (10.4)
Low back pain	23 (47.9)
Lower extremity pain	28 (58.3)

X±SD: Mean ± standard deviation, F: female, M: male, %: percentage, kg: kilogram, m2: square meters, MS: multiple sclerosis, PP: primary progressive, SP: secondary progressive, RR: relapsing-remitting, P: primary school, H: high school, G: graduate from university, n: number

Table 2. Comparison of pain and pain-free groups

	Pain group	Pain-free group	P
Expanded Disability Status Scale	4.27±1.79	3.96±1.83	0.433
Age (year)	36.62±9.60	32.89±8.23	0.090
Duration (year)	7.35±6.31	5.12±4.33	0.141
Beck Depression Inventory	12.39±10.31	13.18±9.49	0.712
Pittsburg Sleep Quality Index	4.50±4.02	2.62±2.37	0.014*
Nottingham Health Profile			
Pain	35.15±31.41	4.38±12.85	0.001*
Physical Activity	46.66±30.97	41.29±27.66	0.406
Energy Level	61.41±38.97	59.42±34.34	0.804
Sleep	29.18±32.75	15.82±21.72	0.033*
Social Isolation	24.64±28.72	22.28±30.62	0.715
Emotional Reactions	31.19±28.28	28.54±30.06	0.676
Total Score	228.25±138.46	171.75±100.28	0.038*

bold*: p<0.05

In addition, it was determined that NHP was affected in patients with pain in terms of pain, sleep and total score compared to patients without pain. Similarly, sleep quality was found to decrease in patients with pain (Table 2).

Analysis of the relationship between pain region and sleep quality showed that there was a weak to moderate correlation between the total sleep quality score and the subgroup scores of upper extremity pain, excluding sleep duration and sleeping pill intake. In addition, it was determined that back pain was weakly correlated with subjective sleep quality in patients (Table 3).

Discussion

Our study is the first to show the relationship between pain localization and sleep in MS patients. The results determined that upper extremity pain affects sleep differently from other pain localizations.

In our study population, it was determined that more than half of the patients complained of pain in at least one body region and the incidence of pain was 55.8%. When the prevalence of pain in MS patients is examined in the literature, it is seen that there are different results. However, Foley et al. reported that the prevalence of pain ranged from 55% to 70% in a meta-analysis they conducted [16]. Our patient group is similar to other studies in terms of the incidence of pain.

It is seen that our patients mostly suffer from lower extremity and back pain. In studies on pain in MS, it has been shown that the most frequently reported pain after a headache is back pain and lower extremity pain [17]. In terms of pain distribution, our patient population showed similar characteristics to the populations of other studies in the literature.

The relationship between pain, disease severity, depression level, sleep and quality of life has been investigated in many studies on MS patients. Comparing the MS group with and without pain in our study showed that the groups were similar in terms of disease severity and depression level, but different in terms of sleep quality and quality of life. The prevalence of pain increased with higher EDSS values in MS according to previous studies [2, 5, 18]. In addition, age, disease duration, and MS type were also associated with pain in these studies. Since the groups were not different in terms of these variables interacting with EDSS, the EDSS scores of the groups may have been similar. Comparably, although many studies have shown the relationship between depression and pain [17], there was no difference in depression levels between the pain group and the pain-free group in our study. Day et al. [19] contend, however, that the correlation between pain and depression has been overstated in earlier studies because when the severity of MS symptoms is reduced, the association between pain and depression becomes controllable. The homogeneity of the groups in terms of disease severity in our study may have caused this result.

The relationship between sleep and pain in MS patients was determined in previous studies [18, 20]. Furthermore, Amtman et al. reported that pain affects sleep more than sleep affects pain [21]. In our study, we determined that the painful group and the pain-free group were different in terms of sleep quality as in the literature. Additionally, the quality of life varied

Table 3. Correlation between the painful region and sleep quality

		Headache and neck pain	Upper extremity	Upper back pain	Low Back pain	Lower extremity pain
Subjective sleep quality	rho	0,141	0,498	0,265	-0,173	-0,099
	p	0,338	0,001*	0,071	0,239	0,503
Sleep latency	rho	0,221	0,44	0,271	-0,07	-0,063
	p	0,132	0,002*	0,062	0,638	0,668
Sleep duration	rho	-0,07	0,18	0,137	-0,051	-0,043
	p	0,624	0,221	0,351	0,729	0,77
Sleep disturbance	rho	0,127	0,038	0,133	0,018	0,077
	p	0,39	0,799	0,366	0,904	0,602
Daytime dysfunction	rho	-0,003	0,153	0,057	-0,091	-0,175
	p	0,982	0,3	0,701	0,541	0,233
Habitual sleep efficiency	rho	0,146	0,343	0,383	0,115	-0,104
	p	0,322	0,017*	0,007*	0,436	0,482
Sleeping medication	rho	0,146	-	-0,152	-0,205	0,056
	p	0,322	-	0,301	0,162	0,704
Pittsburg Sleep Quality Index-Total Score	rho	0,095	0,379	0,249	0,006	-0,035
	p	0,522	0,008*	0,088	0,967	0,812

bold*: p<0.05, rho: Spearman's rank coefficient of correlation

between groups in the subsections related to pain and sleep. This outcome appears to illustrate how pain and sleep interact. In contrast to the literature, the impact of pain localization on the quality of sleep was also examined in our study. Global sleep quality, subjective sleep quality, sleep latency, and habitual sleep efficiency were all shown to be impaired by upper extremity pain; other pain localizations did not have any effects other than habitual sleep efficiency. There are various articles in the literature that might imply a connection between upper extremity pain and sleep. Kezele et al. [22] determined that combined upper extremity and respiratory exercises reduced the overall pain intensity in patients with MS patients with pain in general. Peters et al. [23] stated in their study that practices aimed at reducing pain might affect sleep disorders in patients with different upper extremities problems. Tajika et al [24] showed that there is a relationship between upper extremity pain and sleep disturbance in the general elderly population. In light of this information, we think that upper extremity pain may be a key point for sleep. There could be several reasons for this. Primarily, the upper extremity is widely represented in the motor and sensory homunculus [25]. This suggests that there may be an unproven connection between upper extremity pain and sleep. The upper extremity plays a crucial role in a person's daily life activities, and the slightest disruption in these activities may change the person's perception of disability and be reflected in their sleep from a biopsychosocial perspective. In addition, the fact that the upper extremity is constantly in the visual field may alter the person's awareness and pain perception indirectly and indirectly affect sleep. Even though it is clear that all of these points are debatable and that further study is required, we believe that upper extremity pain should be assessed independently in sleep difficulties in MS patients.

The present study has several limitations. The small sample size and the lack of assessment of fatigue in MS patients are important limitations. In addition, the exclusion of pain types such as nociceptive, musculoskeletal, and neural pain can be considered a limitation.

Conclusion

We determined that pain, especially upper extremity pain, affects sleep and therefore quality of life in patients with MS. For this reason when examining the pain of MS patients with sleep problems, especially questioning the upper extremities and adding modalities to the program to relieve pain for this localization may contribute to the improvement of the pain and therefore the sleep quality it affects. Thus, the quality of life can be positively affected in many ways. Studies in a larger patient population with characteristics such as pain types and MS subtypes, pain duration, fatigue, anxiety, and comprehensive psychosocial assessments may reveal the relationship between sleep and upper extremity pain in detail.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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